

630-7
UTIB
no. 2
C-4

✓ AGX

Circulating copy
Agricultural Library

THE UTAH
AGRICULTURAL COLLEGE
Experiment Station.

BULLETIN No. 1.

Investigations in Progress at the Station.

⇒ JUNE 1890 ⇒

J. P. SMITH, PRINTER, LOGAN.

OFFICERS OF THE EXPERIMENT STATION:

The Board of Trustees of the Agricultural
College of Utah.

STATION STAFF:

J. W. SANBORN.....	DIRECTOR
E. S. RICHMAN.....	Horticulturist and Entomologist
W. P. CUTTER.....	Chemist
A. S. MILLS.....	Supt. of Farm Experiment Work
J. R. WALKER.....	Clerk and Stenographer

POST OFFICE: LOGAN, UTAH.

The Bulletins of the Station will be issued every two to three months, and will be sent free to every one requesting a copy.

BULLETIN No. 1.

A GENERAL STATEMENT OF THE PURPOSES OF THE UTAH AGRICULTURAL EXPERIMENT STATION AND OF THE EXPERIMENT WORK IN PROGRESS AND TO BE ENTERED UPON.

By J. W. SANBORN, Director.

THERE seems to be a very general and decisive manifestation of interest on the part of the citizens of Utah in the Utah Agricultural Experiment Station and also in the Agricultural College of Utah. Information regarding the Station is so much sought that it is deemed best to place before the public a general statement of its organization and of its proposed work. The writer believes that it is better to make Station bulletins the medium through which the results of Station research is reported to the public rather than that of compilation and proclamation. Yet in this Bulletin, as the only exception that will occur to the principle enunciated will, for the purpose of general and more definite information, be given a historic review of the organization and prospective work of the Station, hoping thereby to increase the opportunities for mutual helpfulness and the prospect of a mutual understanding between the Station and those for whom it was founded.

HISTORIC SUMMARY.

The demand for Agricultural Experiment Stations is the direct outgrowth of the development of the natural sciences, which have shown the great truth that agriculture is broadly founded in the laws of nature. No other industry or profession is so deeply anchored in law and none is so complex in its ramifications.

From the opening of this century until 1840, able men in moments spared from the pressure of other investigations, devoted their genius to researches in the fascinating field of science in its application to agriculture. About 1840, Lawes & Gilbert in England and Boussingault in France, began systematic researches in agriculture. Their brilliant work coupled with the more brilliant inductions and deductions of Liebig led to the organization of the first official experiment station at Moeckern, Germany, in 1851. It is said that Germany now has 123 such stations. Connecticut in 1854 organized the first experiment station in this country. The example was imitated by other States until their value was so far demonstrated that the nation took up the movement and gave it a national character by an act passed by Congress, March 2d, 1887.

This act located an experiment station in connection with the agricultural college of each State or wherever such a college was located and where a state desired such a station.

These stations were organized with a gift of \$15,000 from the National Treasury for the first year and with a presumptive gift of \$15,000 for each year thereafter.

The Utah Experiment Station was founded by an act of the Territorial Legislature of 1888. It was not actually organized for work until near the opening of 1890, when a Director was appointed. By virtue of this fact Congress has given to it but \$10,000 for the present year. This sum has not as yet, June 15th, been received.

PURPOSES OF THE STATIONS.

Congress defined in detail the object of these stations. In brief they are for research in any subject within the broad domain of agricultural art and science that will be of economical value to farmers and through them of value to consumers. The stations are not or should not be for the purpose, as some seem to believe they are, of compilation and dissemination of present literature. Newspapers and farm organizations are ample mediums for this purpose. By rod, measure and scale in all the unverified fields of agricultural thought (which is practically the whole field) exact data are to be secured in order to supplant conjecture by certainty, the rule of thumb process by the reign of law. Countless billions of farmers have pursued their industry previous to the middle age of the present generation, and left behind them no settled laws that any group of farmers previous to that date could have been found to be in accord upon, notwithstanding the fact that there is not a single operation on the farm that does not involve some

mathematical, mechanical, physical, or natural law—laws capable of solution and fuller and of more importance to humanity than laws in any other domain of life.

These stations, existing for investigation and not primarily as teaching adjuncts of college class rooms, are to sacredly devote their funds to this purpose of research.

THE WORK OF THE UTAH STATION.

At the opening of the past Spring it had eighty-five acres of upper bench land covered with sage brush, and the hope of an appropriation from Congress. The ground has been plowed, cleared of bushes, and is mostly cleared of rocks, is fenced and has fine buildings under contract—five now going up.

One is a bank barn, 62 feet square and 35 feet high, and is surrounded by a silo, root cellar, hog house, engine house and wagon shed. All of the work is to be done in this barn from a common centre. Its crops go in by power and are taken out for use by gravity.

It has a fine laboratory building for offices, for chemical research and for other station work.

It will have the use of a new and model farm and dairy house, distinguished, it is believed, by its conveniences for household and dairy work. Two new laborers' cottages are connected with the station.

The Chemical department has a very complete outfit, while a round of appliances for farm and horticultural experimentation have been collected.

This work has been aided by a Territorial appropriation for buildings, farm tools and stock. It is proper to say that the Territory has manifested a very liberal spirit towards both the Station and the College, a continuation of which will soon place both of them, expenditures being equally wise, among the best of the country. The spirit of the law has been the guide of the Trustees, thereby opening a fair field for the investigators and teachers associated with the College and Station.

EXPERIMENT WORK INAUGURATED.

Eighty-five acres of the farm are now covered with crops; forty acres are serving the combined purpose of inquiry and economic farming. Regarding these acres as experimental acres, for such a purpose they were intended to serve, the farm is divided into the following lines of inquiry:

1. Fifteen acres are sown to eight varieties of grasses for a pasture of mixed grasses, in order to test the value of mixed grasses versus single pasture grasses.

2. Ten sections are sown to as many varieties of grass, except the tenth half acre, which is mixed grasses. These are to be grazed by lots of similar animals in each, and growth of animals on each are to be weighed.

3. Twenty-four varieties of grasses and clovers are sown on plats for test of varieties.

4. Varieties of oats, wheat, corn and barley are being tested.

5. A line of the most promising varieties of forage crops are being tested.

6. The sugar plants—sorghum and sugar beets—are being tested with reference to the sugar product. A sugar beet factory is likely to be erected in the Territory, hence this inquiry.

7. Sixty-three plats are devoted to irrigation trials:

a. Night versus day irrigation.

b. Flooding and other systems are being tested.

c. Varying amounts of water are being used and results noted.

d. Varying amounts at a given time, but total amount for the season remaining the same.

e. Sub-irrigation versus surface irrigation.

f. Length of season that irrigation can be continued successfully.

g. Relation of irrigation to soil fertility.

h. The amount of water percolating through soil under varying applications.

i. Influence of Fall irrigation.

j. Manures in their relation to irrigation.

k. Mulching in connection with irrigation.

l. Lateral movement of water in the soil in irrigation.

m. Test of a part of above questions by the use of vessels.

8. Zinc boxes devoted to testing vaporization of water, soils and of the various crops.

9. Continuous test of the power of crops to secure nitrogen from the air.

10. Mulching of corn and of potatoes and the relation of a mulch to yield of crop, to soil temperature, moisture and soil fertility.

11. Mulch of earth to above relations.

12. Drilled versus checkrowed corn.

13. Hilling versus flat culture of corn.

14. No tillage, shallow tillage and deep tillage for corn and potatoes and their relations to soil moisture, root growth and crop yield.

15. No harrowing of the ground, and little or much harrowing before planting.

16. No plowing, shallow plowing and deep plowing for wheat and potatoes.

17. Various methods of tillage for potatoes.

18. Various methods of planting potatoes in trenches, shallow and otherwise.

19. Distances of planting potatoes, thirty-six distances being used.

20. Various methods of cultivating potatoes and of using seed potatoes.

21. Various times of planting and harvesting potatoes.

22. Various amounts of seed wheat.

23. Varying times of sowing wheat.

24. Broadcasting versus drilling wheat.

25. Hoeing wheat, rolling and not rolling wheat. etc.

26. Distance of drilling wheat.

27. Varying times of harvesting wheat.

28. Selected seed, versus average seed and poor seed.

29. Time of plowing and style of furrow.

30. Depth of sowing wheat.

31. Manure trials, utility, method of application, etc.

32. Soiling cattle.

33. Green versus dry food for cattle.

34. Green manuring.

35. Rotations.

a. Six years' rotation.

b. Four years' rotation.

c. Three years' rotation.

d. Two years' rotation.

e. All of the above rotations have each crop of the rotation start the series, so that there will be in each rotation a yearly answer without waiting six years or the number of years of each rotation involved for an answer to the problem.

Special attention will be given in these rotations to a test of all of the relations of a rotation to soil fertility.

The scientific relations of all of the various questions studied will be closely observed.

36. When the barn is completed, feeding trials will be entered upon along several lines of inquiry in animal nutrition, for each class of our domestic animals—hogs, sheep, horses and cattle. The barn will have a silo, root cellar and other conveniences for feeding trials. Storage of foods in their various relations will be studied, etc. The effect of temperature on the economy of cattle feeding will be investigated.

A full line of meteorological instruments will be in use. A superior dynamometer for test of draft of tools, etc., will be at command. This forms an outline of the work for the coming year.

but does not state all the questions that will be investigated on the farm.

HORTICULTURAL DEPARTMENT.

The Horticultural Department contains twelve acres. It will be fully covered with crops designed for investigation and for school room teaching.

1. It has set an important line of economic forest trees not grown in the Territory, for test in this climate.
2. It has growing seventy-five varieties of apple trees.
3. It has growing twenty-five varieties of pear trees.
4. It has growing twenty-five varieties of plum trees.
5. It has growing forty varieties of peach trees.
6. It has growing twenty-five varieties of cherries.
7. It has growing thirty varieties of strawberries, eight of raspberries, eight of apricots, and various other fruits.
8. It has varieties of vegetables, including potatoes, under test.
9. It has in progress tillage and irrigation tests of crops falling within its sphere of work.

This department of the station work will be conducted fully in the interests which it represents.

CHEMICAL DEPARTMENT.

The Chemical Department has not as yet its organization completed, so that work is not as yet inaugurated by the chemist. This department has a very complete equipment and will enter vigorously into researches that fall within its sphere, which is a very wide one. It is expected that it will be able to enter in a limited way upon its work in early July and fully so during the latter part of August.

OTHER WORK.

The first period of organization absorbs funds rapidly. When the organization is completed and expenses are reduced to their normal level other lines of work will be entered upon covering a wider field. Entomology, animal and vegetable diseases, and other fields, may well be made specialties of. The station will cover all of the ground that it can adequately cover. It will, however, be a distinct policy of the station to avoid attempting to cover too many fields of inquiry. The spreading of the station resources over too much ground will

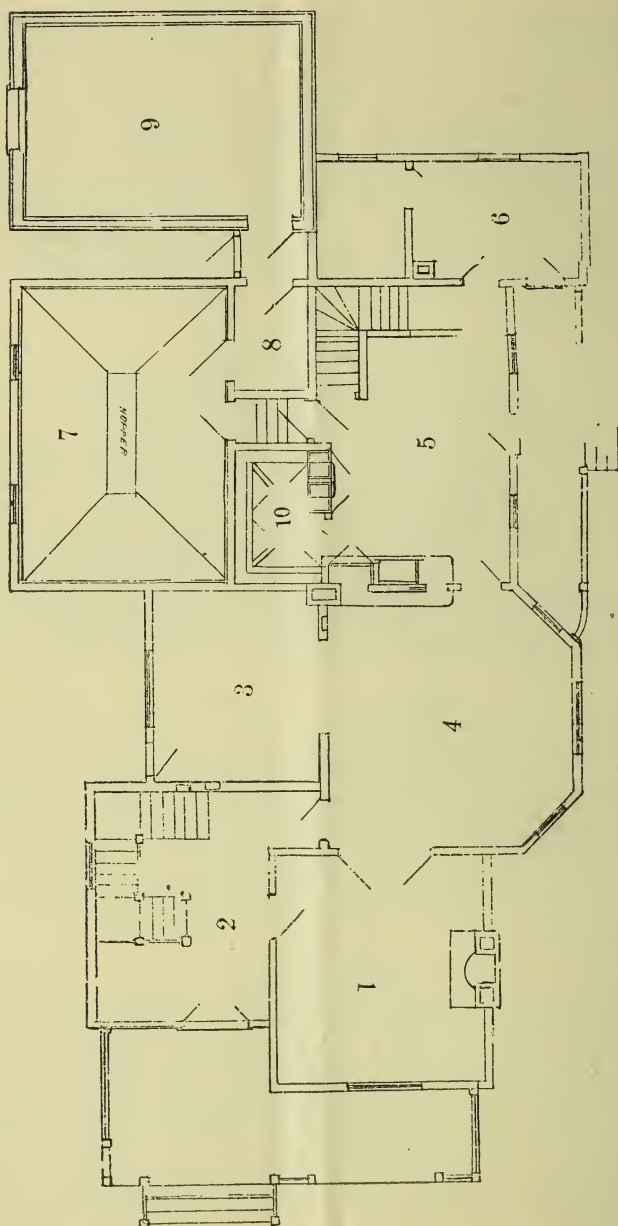
result in indifferent work all along the line. It is better for each of the fifty stations of the country to be strong in whatever direction local conditions and special tastes of those in charge demand, than to do uncertain work over a wide field. If in the inquiries the underlying principles are sought then much of the work done at the stations will be of universal application, and thus local interests and the general interests of the whole country will be best served. All fields of the general work are likely to be involved by the group of National Stations, and thus make it unnecessary for each one to cover the whole field.

GENERAL SUGGESTIONS.

All of the Bulletins of this station will be mailed free of charge to the address of any one desiring them.

Insects or economic plants that interested parties desire identified will be reported upon if forwarded to the station. Information from those interested will be welcome, and requests for work that will be of general interest to farmers will be undertaken when the work on hand will admit. Correspondence upon questions relating to the field of inquiry of this station will always be cheerfully received and considered.

Bulletins will be issued every two to three months or oftener.



FLOOR PLAN OF HOUSE.

This is a diagram of the floor of the house. The plan is incorrect, as it does not show the full width of the library room, or room No. 3, nor the pantry as completed. The pantry projects into room No. 3 so that it has direct communication with the dining room, or room No. 4. The plan is shown because it is believed that it represents a very convenient house.

Room 1 is the parlor, room 2 is the reception hall, room 3 is the library, and room 4 is the dining room. The reception room and library open into each other, although the cut does not so show them. These four rooms can be thrown open for receptions, forming a complete circuit.

Room 5 is the kitchen and 10 is the pantry. From the dining table the dishes are passed to the sink without passing out of the room and through a neat door. Standing at the sink, which is supplied with hot and cold waters, the dishes are washed and passed into a cupboard at the right of the sink, without moving from it. The dishes are taken out of the cupboard for the dining table from the dining room side. All of this work is done within a narrow circuit and with little movement.

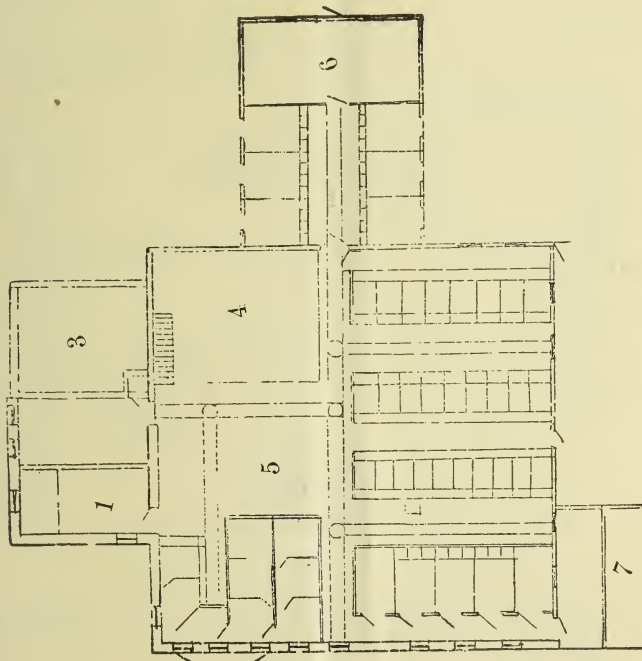
The victuals pass towards the dining room from the stove in being placed in the pantry. From the pantry they are taken direct to the dining table, as before stated.

Room No. 6 is a laundry, connected with it is a store room for coal.

Room No. 7 is the dairy room; No. 8 is the cold room and No. 9 is the ice house. The dairy room is laid with cement on the ground, depressed from the outside to the center, from which a glazed pipe carries away water. The dairy room is shut off from the kitchen by two doors and a passage. It can be used with the house or independently of it.

The ice from the ice house passes directly into the cold room without having to be taken out of doors.

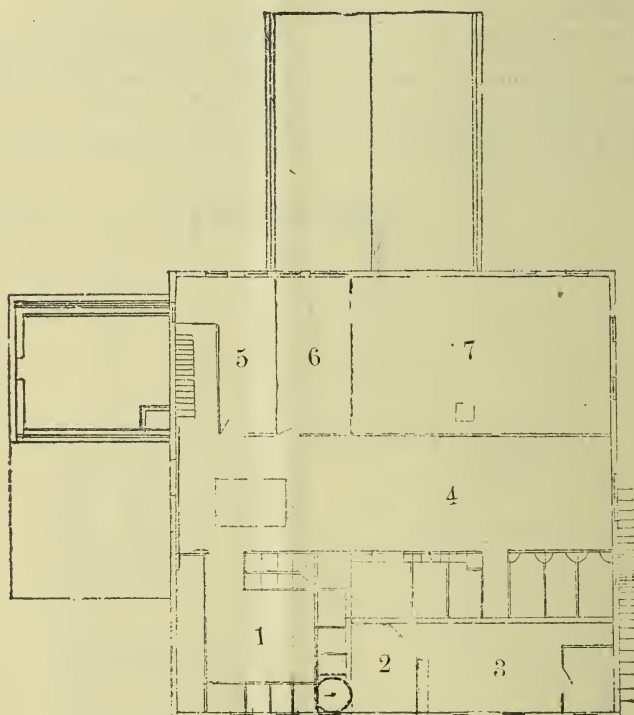
BASEMENT OF BARN — WEST.



Room No. 1 is the engine room; No. 2 root cellar; No. 3 silo; No. 4 working room of the Horticultural Department; No. 5 a square with a cement floor where cutting foods, cooking foods, weighing stock and other experimental work is performed. On the south-west is seen the sheep pens; on the south side the box stalls. No. 7 is an open shed for carts and wagons, and No. 8 a slaughter section. This is a part of the hog house.

The root cellar is filled from a flat roof above by gravity. A track is seen with turn tables, over which a hand car carries food, and which can be used to carry off the manure to cement vaults without the building. The cattle stand on raised floors of varying kinds, while a raised passage stands between the rear ends of the double rows of stock. Running water is taken in the trough of each animal.

The horses pass by the open shed on the way from work to their stalls. The ground gently inclines to the shed, so that wagons can be easily run in by hand. The wagon beds are easily swung up under the roof above them by one man, by means of an appliance used.



FIRST FLOOR OF BARN,

Room No. 1 is the granary room. The grain is run into the bins either directly from the machine on the floor above, or is drawn up and dumped by horse-power by a mechanical arrangement devised by the writer for the purpose and which works admirably. The corn is thus carried to its bins. From boxes with

hopper bottoms the ground grain is drawn out for use in the stock basement below, No. 2 is a catch-all room. No. 3 is the square in which grooming is done. This is surrounded by shelves, a harness room and medicine cupboard. The horse stalls are readily seen. No. 5 is a room for horticultural tools, and No. 6 is for small farm tools. These rooms have the cut of each small tool on their walls; each tool is thus always readily kept in place. No. 7 is for a carriage room at one end, and for the large tools of the farm at the other end. A smaller tool room is above this, into which tools out of season are drawn up by pulleys always kept hanging over a trap door.

Scales are shown on the main floor. Entrance to this floor is over the roof of the root cellar and by the side of the silo.

The barn is ventilated from the side walls and by tubes up the interior. These latter ventilating shafts are used for the passage of the hay and other foods of the lot to the basement below.

The barn is square and the working parts are so arranged that it is believed that it is difficult to arrange a barn to accomplish the proper work with less steps than this barn requires. No crops are carried to their place by hand power in storing, while all are fed out by the minimum amount of labor requisite in a practicable barn.

ELEVATION CUTS.

The cuts showing the elevation of the Laboratory and Farm House were taken from the architect's drawings, and hence show only one side of, and very imperfectly the quite artistic buildings, which are of superior design in their exterior appearance.

After some hesitation I use them, notwithstanding they do not do the buildings justice.

The cut of the barn was too imperfect for use. The cut of the barn and a floor plan of the laboratory will be shown in a later bulletin.



LABORATORY.



FARM HOUSE.

Circulating copy

Agricultural Library